CLAIMS

What is claimed is:

1. A plasma etching method for improving an etching profile comprising the steps of:

providing a substrate including an oxide containing insulating layer in a multilayer semiconductor device;

providing a patterned photoresist layer exposing an uppermost layer of the substrate for anisotropically plasma etching a first opening;

anisotropically plasma etching through a thickness of at least a portion of the substrate to form the first opening;

blanket depositing an etching stop liner to cover at least a portion of the sidewalls of the first opening;

patterning according to a photolithographic process for etching a second opening at least partially overlying and encompassing the first opening; and,

anisotropically plasma etching through at least another portion of the thickness of the substrate including the first opening to form a second opening at least partially overlying a remaining portion of the first opening.

2. The method of claim 1, wherein the first opening comprises a via opening and the second opening comprises a trench line opening to form a dual damascene structure.

3. The method of claim 2, wherein the dual damascene structure comprises a trench portion and via portion having a via/trench interface formed in a continuous portion of the oxide containing insulating layer.

4. The method of claim 1, wherein the step of blanket depositing includes depositing the etching stop liner to conformally cover at least the sidewall and bottom portions of the first opening.

5. The method of claim 1, wherein the etching stop liner includes at least one of a metal nitride and a metal carbide.

6. The method of claim 5, wherein the etching stop liner includes at least one of silicon nitride, silicon carbide, silicon oxynitride, and titanium nitride.

7. The method of claim 5, wherein the etching stop liner is formed over a thickness of about 50 Angstroms to about 500 Angstroms.

8. The method of claim 1, further comprising the step of forming a plug to at least partially fill the first opening following the step of blanket depositing.

9. The method of claim 8, wherein the plug is at least partially filled to a level in the first opening to a level at least equal to a predetermined depth of the second opening formed during the step of anisotropically plasma etching through the at least another portion.

10. The method of claim 8, wherein the plug is formed of at least one of a resinous polymer and a photosensitive resinous polymer.

11. The method of claim 10, wherein the photosensitive resinous polymer is at least partially cured by exposure to polymerizing radiation.

12. A plasma etching method for improving an etching profile in a dual damascene structure comprising the steps of:

providing a substrate including an oxide containing insulating layer in a multilayer semiconductor device;

providing a patterned photoresist layer exposing an uppermost layer of the substrate for anisotropically plasma etching a via opening;

anisotropically plasma etching through a thickness of at least a portion of the substrate to form the via opening;

blanket depositing an etching stop liner to cover at least a portion of the sidewalls of the via opening;

patterning according to a photolithographic process for etching a trench line opening at least partially overlying and encompassing the via opening; and,

anisotropically plasma etching through at least another portion of the thickness of the substrate including the via opening to form a trench line opening at least partially overlying a remaining portion of the via opening to form a dual damascene structure.

13. The method of claim 12, wherein the dual damascene structure comprises a trench portion and via portion having a via/trench interface formed in a continuous portion of the oxide containing insulating layer.

14. The method of claim 12, wherein the step of blanket depositing includes depositing the etching stop liner to conformally cover at least the sidewall and bottom portions of the via opening.

15. The method of claim 12, wherein the etching stop liner includes at least one of a metal nitride and a metal carbide.

16. The method of claim 15, wherein the etching stop liner includes at least one of silicon nitride, silicon carbide, silicon oxynitride, and titanium nitride.

17. The method of claim 15, wherein the etching stop liner is formed over a thickness of about 50 Angstroms to about 500 Angstroms.

18. The method of claim 12, further comprising the step of forming a via plug to at least partially fill the via opening following the step of blanket depositing.

19. The method of claim 18, wherein the via plug is at least partially filled to a level in the first opening to a level at least equal to a predetermined depth of the trench line opening formed during the step of anisotropically plasma etching through the at least another portion.

20. The method of claim 8, wherein the plug is formed of at least one of a resinous polymer and a photosensitive resinous polymer.